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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/658,441	09/08/2003	Bruce A. Block	10559-859001	4710

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EXAMINER	
PEACE, RHONDA S	

ART UNIT	PAPER NUMBER
2874	

DATE MAILED: 04/26/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/658,441	BLOCK ET AL.	
	Examiner	Art Unit	
	Rhonda S. Peace	2874	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☐ Claim(s) _____ is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1-29 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on 08 September 2003 is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date 9/8/03 & 2/24/05.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

Information Disclosure Statement

The information disclosure statements (IDS) submitted on 9/8/2003 and 2/24/2005 were filed in compliance with the provisions of 37 CFR 1.97. Accordingly, the information disclosure statement were considered by the examiner and made of record, as indicated by the attached initialed copy of form PTO-1449.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1, 2, 6-9,12-16, and 17-22, 24, 27 and 29 are rejected under 35 U.S.C. 102(b) as being anticipated by Leonard (US 5533151).

As to Claims 1, 2, and 27 Leonard (US 5533151) discloses a optical modulator comprising a waveguide core **(figures 8 and 10: item 34)** in contact with a waveguide cladding **(figure 8: item 40, figure 10: item 36)**, wherein the cladding has an index of refraction less than that of the waveguide core and its refractive index responds to the introduction of a control signal (column 2 lines 2-10 and 35-49, column 6 lines 50-54) provided by an electrode(s) **(figures 8 and 10: item 42)** connected to a control unit (column 2 lines 39-40). The method by which to operate a waveguide, as described, is inherent to Leonard's disclosure.

Addressing Claims 6-9 and 29, Leonard (US 5533151) also teaches the various types of materials that may be used in the construction of the described waveguide. As

to the waveguide core, Leonard shows this core may be constructed using a semiconductor, more specifically, silicon (column 3 lines 64-66, column 6 Table). In addition, Leonard shows the waveguide cladding may be constructed using an electro-optic polymer (column 2 lines 35-49, column 6 Table).

Regarding Claims 12-16, Leonard (US 5533151) illustrates embodiments wherein the following are shown: waveguide core is surrounded by the waveguide cladding, waveguide core and cladding are in planar layers in contact with one another, waveguide core having a strip shape and being both atop the waveguide cladding and embedded within the cladding, and the waveguide core and cladding form a ridge waveguide (column 5 lines 30-42, column 6 lines 34-43, figures 8 and 10).

As to Claims 17-22, Leonard (US 5533151) discloses an optical modulator comprising a substrate, a first cladding layer formed over the substrate, a waveguide core formed upon the first cladding layer and further in contact with a second waveguide cladding, wherein the second cladding has an index of refraction less than that of the waveguide core and the cladding's refractive index responds to the introduction of a control signal (column 2 lines 2-10 and 35-49, column 6 lines 50-54) provided by a pair of electrode connected to a control unit (column 2 lines 39-40, figures 8 and 10). Leonard also teaches the substrate may be formed of a semiconductor, more specifically silicon; the first cladding layer may be formed from an insulating material, more specifically an oxide or nitride (column 6 Table).

As to Claim 24, Leonard shows a plurality of electrodes along a longitudinal direction in a periodic pattern that would create a spatial periodic index variation within the adjustable cladding (figures 6 and 7)

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 3 and 28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Leonard (US 5533151) in further view of Lide (CRC Handbook of Chemistry and Physics). Leonard discloses the basic invention as discussed above. Leonard does not specifically disclose the ranges of index of refraction for both the core and cladding layers. Lide shows the index of refraction for silicon, the waveguide core material, to lie within the range of 0.257 to 6.709 (page 12-144). Use of dopants cause a wide variety of values for the index of refraction of the core, as dopant addition to the waveguide core increases its index of refraction. Indices of refraction of the cladding layer within the range of 1.4 to 2.4, creating a difference between core index of refraction and cladding index of refraction of about 1 to 2, are well known in the art for chromophore-doped polymers.

Claims 4, 5, 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Leonard (US 5533151) in further view of Ramdani et al (US 6493497). Leonard

discloses the basic invention as discussed above. Leonard does not specifically disclose the use of an integrated circuit, CMOS circuit, or ferroelectric material within the waveguide core. Ramdani discloses an electro-optic waveguide fabricated with an integrated circuit, more specifically a CMOS circuit, that supplies a control signal by which to vary the index of refraction in a waveguide (column 7 lines 36-66). Because both references are directed to the application of control signals to waveguides, and since Ramdani teaches that CMOS integrated circuits are ideal for fabrication of such circuits (column 7 lines 65-66), it would have been obvious to one of ordinary skill in the art to use a CMOS integrated circuit by combining the teachings of Leonard and Ramdani. In addition, Ramdani also discloses a waveguide core including a ferroelectric material, specifically strontium barium niobate (column 3 lines 17-35). Ramdani also teaches that ferroelectric materials, such as strontium barium niobate, exhibit highly photoreactive properties (column 3 lines 31-34), allowing the waveguide to show a more immediate response to applied electric fields. Therefore, it would have been obvious to one of ordinary skill in the art to couple the teachings of Ramdani and Leonard to produce a waveguide that more effectively responds to changes in the electric field surrounding the waveguide.

Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Leonard (US 5533151) in further view of the cited non patent literature reference by Oh et al. Leonard discloses the basic invention as discussed above. Leonard does not specifically disclose the use of a chromophore-doped cladding layer. The Oh et al reference teaches the use of chromophore-doped polymer within the cladding regions of

the optical waveguide (column 2 lines 18-30). It would have been beneficial to combine the teachings of Leonard with the teachings of Oh et al for the purposes of improving thermal stability, reducing insertion losses, and providing long term photostability within the waveguide cladding while maintaining a high electro-optic coefficient, as specifically taught by Oh et al (column 2 lines 21-24). Due to this, it would have been obvious to one ordinarily skilled in the art to make the cladding of Leonard as an electro-optic polymer doped with chromophore.

Claims 23, 25 and 26 are rejected under U.S.C. 103(a) as being unpatentable over Leonard (US 5533151) further in view of Domash et al (6567573). Leonard discloses the basic invention as discussed above. Leonard does not specifically disclose the use of an optical ring resonator, a second waveguide core such that evanescent couple occurs between the two cores, or a control means by which to supply the control signal. Domash et al discloses a waveguide comprising a core placed between two cladding layers wherein the waveguide core forms an optical ring resonator (column 5 lines 36-44; figure 6B). The device as described by Leonard is an improvement of waveguides that vary the electric field to change the index of refraction of the cladding. Figures 1A and 1B of Leonard show some embodiments of the device, however these two examples are not limiting. Leonard's improvement would be applicable to any device that utilizes a waveguide where the waveguide cladding can be varied using a control signal. It would have been obvious to one skilled in the art to use the teachings of Leonard in an optical ring resonator, as in figure 6B of Domash. In addition, Domash et al discloses a waveguide comprising two waveguide cores wherein

effective coupling occurs between the cores, which are located between a pair of electrodes (column 5 lines 22-33, figures 2A, 2B, 3A, 3B). As previously discussed, Leonard's device is an improvement of waveguides that vary the electric field to change the index of refraction of the cladding. Figures 1A and 1B of Leonard show some embodiments of the device, however these two examples are not limiting. Leonard's improvement would be applicable to any device that utilizes a waveguide where the waveguide cladding can be varied using a control signal. It would have been obvious to one skilled in the art to use the teachings of Leonard in dual waveguide coupler, since the prior art desires improvements to make a coupler more efficient, which can be accomplished applying the teachings of Leonard.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Rhonda S. Peace whose telephone number is (571) 272-8580. The examiner can normally be reached on M-F (8-5).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Rodney Bovernick can be reached on (571) 272- 2344.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Rhonda S. Peace
Examiner
Art Unit 2874

John D. Lee
Primary Examiner